

# Fatigue in Intensive Care Nurses and Related Factors

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## Abstract

**Background:** Fatigue negatively affects the performance of intensive care nurses. Factors contributing to the fatigue experienced by nurses include lifestyle, psychological status, work organization and sleep problems.

**Objective:** To determine the level of fatigue among nurses working in intensive care units and the related factors.

**Methods:** This descriptive study was conducted with 102 nurses working in intensive care units in the West Black Sea Region of Turkey. Data were collected between February and May 2014 using a personal information form, the Visual Analogue Scale for Fatigue (VAS-F), the Hospital Anxiety and Depression Scale and the Pittsburg Sleep Quality Index.

**Results:** The intensive care nurses in the study were found to be experiencing fatigue. Significant correlations were observed between scores on the VAS-F Fatigue and anxiety ( $p=0.01$ ), depression ( $p=0.002$ ), and sleep quality ( $p<0.001$ ).

**Conclusion:** Anxiety, depression and quality of sleep were significantly affected by the intensive care nurses' levels of fatigue. These results can be of benefit in taking measures which may be used to reduce fatigue in nurses, especially the fatigue related to work organization and social life.

**Keywords:** Anxiety; Depression; Fatigue; Critical care nursing; Sleep; Sleep disorders, circadian rhythm

## Introduction

Fatigue is a complex phenomenon that negatively impacts an individual's biological, psychological, and cognitive processes. As a health problem, fatigue results in a reduction in attention and physical capacity, irritability, forgetfulness, difficulties facing unexpected situations, slowing of thought processes, reduction in perception and reaction, and difficulties in communication.<sup>1-3</sup> Cases of fatigue in workplace can be either acute or chronic. Intensive care nurses tend to experience chronic fatigue due to their

heavy workload and round-the-clock responsibilities involving working in units with high-tech equipment, diagnosing and monitoring patients with complicated and life-threatening problems, performing advanced intensive care and treatment procedures and establishing therapeutic communication with patients and their relatives.<sup>4-7</sup>

Previous studies have shown that there is a strong relationship between fatigue and the lifestyles and psychological states of shift-workers, particularly 12-hour or longer shifts and night shifts, working longer than 40 hours per week and workloads.<sup>1,6-12</sup>

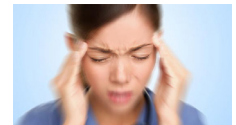
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The roles and responsibilities assumed by intensive care nurses with regard to their work, families and social life cause sleeping problems, insufficient rest, physical and mental stress and emotional changes, all of which lead to fatigue.<sup>4-8,14,15</sup> In Turkey, because the majority of the intensive care nurses are female, in addition to taking the responsibilities related to their workplaces, they also bear much of the responsibilities related to their family life. Moreover, the working hours of nurses are generally longer than 40 hours per week and include 12-hour and 24-hour shifts.

Fatigue in nurses is a major job-related factor, one that directly affects performance, care giving, and decision making.<sup>3,16,17</sup> It can become a substantial problem, often resulting in a breakdown in relations between the nurse and patients, family, and team members, an increase in the potential for mistakes in the administration of medicines and deficiencies in decision making and practices involving the monitoring and observing patients. These impacts of fatigue can lead to a reduction in the quality of patient care and put patient safety at risk.<sup>1,3,6,12,14,16,18,19</sup> It has been reported in a number of studies that risk of fatigue, and consequently, of medical errors, increases in those who work long hours, especially on night shifts.<sup>9,17,19,20</sup>

It is of paramount importance to determine the level of fatigue and the relating factors in nurses to maintain a reliable,

high-quality health care in intensive care units. Although many studies focusing on the effect the fatigue has on performance and its contributing factors have so far been done, we could find no study on this topic in Turkey. This study was therefore conducted to determine the level of fatigue and its relating factors among intensive care nurses in Turkey.

## Materials and Methods

### Study Design

Using a self-reported questionnaire, this descriptive study was conducted among nurses working in intensive care units (ICUs) at a university hospital and at a state hospital in the West Black Sea Region of Turkey. The sample size was calculated based on the results of previous studies on fatigue, sleep quality, anxiety, and depression. Looking for a moderate effect size we estimated a correlation coefficient of 0.30.<sup>6,21,22</sup> Assuming a type I error of 0.05 and a power of 0.80, the minimum sample size was estimated to be 85 nurses.

Nurses were selected through a convenience sampling. The inclusion criteria included having Turkish nationality, providing direct patient care in ICUs, having experience of working in ICU for at least one month, and willing to participate in the study. Nurses were excluded from the study if they were on leave for maternity, illness, *etc*, or if they suffered from any fatigue-related neurological and/or mental problems confirmed by a physician.

Of the total 145 male and female nurses who worked in second and third level ICUs of a university hospital and a state hospital in city center of Zonguldak, Turkey, 102 (70.3%) met the inclusion criteria of the study; 40 nurses were excluded from the study due to maternity leave; three were not willing to participate in the study.

### TAKE-HOME MESSAGE

- Turkish intensive care nurses had poorer sleep quality, and moderate to high level of anxiety and depression.
- Fatigue was associated with levels of anxiety, depression and sleeplessness.
- The type of intensive care unit nurses working in affected the level of fatigue.

### Data Collection

Data were collected between February 10 and March 28, 2014. Nurses were given instructions on four instruments, which were completed within 20–25 min at the end of their work shift.

### Study Instruments

Data were gathered using four instruments: a personal information form, the Visual Analogue Scale for Fatigue (VAS-F), the Hospital Anxiety and Depression Scale (HADS), and the Pittsburg Sleep Quality Index.

#### Personal information form

Using previous similar studies, the personal information form was prepared by the researchers.<sup>6-9</sup> This form included questions about age, sex, level of education, marital status, number of children living at home, amount of income, consumption of caffeine, cigarette smoking, etc. The questions were also about work setting—shift work, type of ICU, patient/nurse ratio, working hours, *etc.*

#### Visual analogue scale for fatigue (VAS-F)

The questionnaire was developed by Lee, *et al*, in 1991.<sup>21</sup> This questionnaire was tested on a sample of 75 healthy individuals and a sample of 57 patients undergoing medical evaluation for sleep disorders by Lee, *et al*.<sup>21</sup> The 18-item questionnaire consists of an energy subscale (7 items) and a fatigue subscale (11 items). Items 1–5 and 11–18 are associated with fatigue and items 6–10 are related to the energy subscale. Scoring is performed with the help of a marked area on a ruler, with 0 being the lowest score and 100 being the highest. High scores for the fatigue subscale and low scores for the energy subscale indicate the severity of fatigue. The validity and reliability of the scale were assessed by Yurtsever and Bedük.<sup>23</sup> Cronbach's  $\alpha$  for the fatigue subscale was 0.89; the value for

the energy subscale was 0.85.

#### Hospital anxiety and depression scale (HADS)

The questionnaire was developed by Zigmond and Snaith.<sup>24</sup> The questionnaire score ranges from 0 (no anxiety) to 3 (highest anxiety) for each question. The cut-off point used in this study for the scale was 10 for the anxiety subscale, and 7 for the depression subscale. HADS has conventionally been used for patients; however, certain studies have applied the questionnaire on non-patient groups, such as nurses.<sup>25</sup> The validity and reliability of the questionnaire among Turkish people were evaluated by Aydemir.<sup>26</sup> Cronbach's  $\alpha$  of the original scale reported to be 0.81–0.85 for the anxiety subscale and 0.78 for the depression subscale.

#### Pittsburg sleep quality index (PSQI)

Developed by Buysse, *et al*, in 1989, this questionnaire deals with sleep quality, sleep latency, duration of sleep, habitual sleep efficiency, sleeping medications, and daytime dysfunctions.<sup>27</sup> Each component receives a score between 0 and 3 points; the total score varies between 0 and 21 points. A total PSQI score of  $\geq 5$  has been interpreted as “poor sleep quality.” The validity and reliability study for use in Turkey was conducted by Ağargün, *et al*,<sup>28</sup> who reported a Cronbach's  $\alpha$  of 0.80.

### Data Analysis

Data were analyzed with SPSS® for Windows® ver 15.0. *Student's t* test was used to compare the means between two groups. Kruskal-Wallis test was used to compare the means among three or more groups. Correlation between VAS-F score and means of age, HADS anxiety, HADS depression, and PSQI was determined by Pearson's  $r$  and Spearman's  $\rho$ . A  $p$  value  $< 0.05$  was considered statistically significant.

**Table 1:** VAS-F scale score of studied nurses and some demographic variables (n=102)

Variables	n (%)	VAS-F Energy		VAS-F Fatigue	
		Mean (SD)	p	Mean (SD)	p
Age	102 (100)	27.5 (9.9)		70.17 (24.66)	
Sex					
Male	24 (23.5)	30.08 (12.19)	0.15	65.20 (30.50)	0.26
Female	78 (76.5)	26.76 (9.08)		71.70 (22.57)	
Education					
Health vocational high school	20 (19.6)	30.10 (13.15)	0.31	58.30 (22.15)	0.11
Undergraduate	9 (8.8)	24.66 (6.51)		71.00 (17.64)	
Bachelor degree	71 (69.6)	27.21 (9.36)		73.15 (25.61)	
Master degree	2 (2.0)	27.00 (1.41)		79.50 (7.77)	
Marital status					
Single	47 (46.1)	29.48 (7.86)	0.06	70.87 (26.35)	0.79
Married	55 (53.9)	25.89 (11.22)		69.58 (23.35)	
Children living at home					
No	63 (61.8)	27.25 (9.99)	0.70	71.14 (25.86)	0.61
Yes	39 (38.2)	28.02 (9.96)		68.61 (22.83)	
Income					
Low (income < expenses)	29 (28.4)	29.03 (9.12)	0.07	71.06 (24.38)	0.84
Moderate (income = expenses)	51 (50.0)	29.09 (9.47)		69.03 (26.75)	
High (income > expenses)	22 (21.6)	22.00 (10.46)		71.63 (20.53)	

**Ethics**

Approval was first obtained from the Ethics Committee of the university (Reg. Number: 11/02/2014/03) and from the directors of each hospital. After receiving approval, a meeting was held with all nurses working in the unit. They were informed of the study's objective and procedure and assured that their anonymity would be secured. Written informed consent was obtained from all participant nurses.

**Results**

In this study we found a Cronbach's  $\alpha$  the

VAS-F of 0.90 for the fatigue subscale and of 0.79 for the energy subscale. For HADS, the coefficient was 0.80–0.68 for the anxiety subscale and 0.67 for the depression subscale. Cronbach's  $\alpha$  was 0.85 for PSQI.

**Association of VAS-F Scale with Nurses' Characteristics**

Majority (n=78, 76.5%) of the studied nurses were female; their mean age was 29.2 years. Most of the nurses (n=71, 69.6%) had a bachelor degree. More than half (n=55, 53.9%) were married and did not have children living at home (n=63, 61.8%). Half of the nurses (n=51, 50%) had

**Table 2:** VAS-F scale score of studied nurses and some work organization variables (n=102)

Variables	n (%)	VAS-F Energy		VAS-F Fatigue	
		Mean (SD)	p	Mean (SD)	p
Type of ICU					
Surgical ICU	16 (15.7)	35.31 (9.13)	0.004	58.62 (30.59)	0.09
Medical ICU	57 (55.9)	24.47 (9.46)		73.58 (24.02)	
Polyvalent ICU	29 (28.4)	27.34 (9.45)		70.44 (21.03)	
Shift type					
Day shift (8 hours)	9 (8.8)	24.00 (11.25)	0.57	74.55 (19.86)	0.09
Rotating shift (2×12 hours)	85 (83.3)	27.98 (10.22)		68.88 (25.11)	
Rotating shift (3×8 hours)	4 (3.9)	24.50 (1.00)		96.25 (18.26)	
Night shift (12 hours)	4 (3.9)	29.25 (1.50)		61.25 (18.00)	
Hours worked per week					
40–48 hours	70 (68.6)	26.97 (8.43)	0.45	68.98 (23.89)	0.47
49 hours and over	32 (31.4)	28.81 (12.70)		72.78 (26.46)	
Patient/nurse ratio (day shift) (n=98)					
1 patient	8 (7.8)	18.37 (11.57)	0.06	69.25 (10.27)	0.64
2–3 patients	69 (67.6)	28.15 (9.92)		69.62 (25.05)	
4 and more patients	21 (20.6)	28.95 (7.76)		64.38 (25.90)	
Patient/nurse ratio (night shift) (n=93)					
2–3 patients	35 (37.6)	28.25 (12.18)	0.94	72.08 (27.08)	0.38
4 and more patients	58 (62.4)	28.10 (8.09)		67.37 (24.05)	

a moderate income. Most of studied nurses did not consume alcohol (n=91; 89.2%) or smoke cigarettes (n=72; 70.6%). Personal characteristics were not associated with VAS-F fatigue and VAS-F energy scores. However, higher VAS-F fatigue scores were found in female nurses with master's degrees, who were single, did not have children, and had a high income (Table 1).

#### Association of VAS-F Scale with Nurses' Work Organization

Half of the nurses who worked in surgical, medical and polyvalent ICUs (n=57; 55.9%) worked in medical ICUs. A large

majority of the nurses (n=85; 83.3%) worked a two-shift rotation; 70 (68.6%) worked between 40 and 48 hrs/wk. According to the nurses' reports, 69 (67.6%) nurses provided care to two or three patients on the day shift; more than half of the nurses (n=58; 62.4%) provided care to four or more patients on the night shift in the ICUs. No significant difference was found between nurses' work organization and VAS-F scores. VAS-F energy score was significantly (p=0.004) different depending on the type of ICU (Table 2).

**Table 3:** Correlations between VAS-F score and HADS-Anxiety, HADS-Depression, and PSQI scores

	VAS-F Energy	VAS-F Fatigue
HADS-Anxiety <sup>a</sup>	0.02	0.23*
HADS-Depression <sup>b</sup>	0.01	0.29**
PSQI <sup>a</sup>	-0.22*	0.40**

<sup>a</sup>Spearman's  $\rho$ , <sup>b</sup>Pearson's  $r$ , \* $p < 0.05$ , \*\* $p < 0.001$

### VAS-F, PSQI and HADS of the Intensive Care Nurses

The studied nurses were found to have fatigue (mean VAS-F fatigue score of 70.17 [SD 24.66]; mean VAS-F energy score of 27.54 [9.94]), poor sleep quality (mean score of 7.25 [SD 3.70]), and moderate level of depression (mean score of 7.39 [SD 3.65]) and anxiety (mean score of 8.44 [3.54]). Seventy-two (70.5%) nurses reported poor sleep (a score  $\geq 5$  on PSQI scale). Anxiety was reported by 44 (43.1%) nurses, and depression by 59 (57.8%). Using Shapiro-Wilk W statistic, we found that the distribution of HADS-A ( $p = 0.066$ ), VAS-F fatigue score ( $p = 0.096$ ), and VAS-F energy score ( $p = 0.151$ ) were normal. HADS-D ( $p = 0.002$ ) and PSQI ( $p < 0.001$ ) scores were, however, not normally distributed.

There were significant correlations between VAS-F fatigue score and the level of anxiety ( $p < 0.05$ ), depression ( $p < 0.001$ ), and poor sleep quality ( $p < 0.001$ ). Level of fatigue was significantly increased in nurses who had higher levels of anxiety and depression, and lower sleep quality. VAS-F energy score was negatively associated with sleep quality ( $p < 0.05$ ); however, it was not significantly associated with anxiety or depression (Table 3).

### Discussion

In the current study, the level of fatigue experienced by intensive care nurses was de-

termined. In previous studies, it has been reported that intensive care nurses experience fatigue for a variety of reasons.<sup>6,29,30</sup> In their study involving 1482 nurses working in acute care units, Smith-Miller, *et al*,<sup>28</sup> found that 92% of the nurses experienced fatigue. Blouin and Smith-Miller also reported that most of nurses experience low to moderate (66%) or moderate to high (68.4%) levels of fatigue.<sup>2</sup> Abdul Rahman, *et al*, also reported high prevalences of acute and chronic fatigue among critical care nurses.<sup>31</sup>

Previous studies reported that there is a relationship between fatigue and difficulty in sleeping—especially in those working in night shifts.<sup>6,9,32</sup> Ruggiero also reported that poor sleep quality disrupts nurses' experience of fatigue.<sup>6</sup> Zverev and Misiri found that night shift work has a negative effect on sleep quality, and that it causes fatigue in the workers the following day.<sup>32</sup> Han, *et al*,<sup>33</sup> and Smith-Miller, *et al*, showed that rotating shifts are significantly related to fatigue.<sup>17</sup> Blouin and Smith-Miller reported that nurses who worked in rotating shift experience moderate to high level of fatigue. Furthermore, they reported that nurses who worked in night shift experience low to moderate level of fatigue.<sup>2</sup> In keeping with these results, we found that intensive care nurses had poor sleep quality and experienced higher levels of fatigue. Moreover, a strong positive correlation was found between poor sleep quality and the level of fatigue. No significant association was observed between type of shift and level of fatigue.

We found a high level of anxiety and depression in intensive care nurses who worked an eight-hour rotation and had a low income. A significant positive correlation was found between the level of fatigue and the levels of anxiety and depression that would suggest that a fall in resistance to the existing physical, mental and emotional stress in nurses might lead to anxi-

ety, depression and ultimately fatigue.<sup>7,10</sup>

This study had several limitations. First, the results were mostly self-reported. This study also had all limitations of a cross-sectional study. Lastly, the study was conducted on a small sample from Turkey and thus may not be generalized to other nurses.

Our findings can be of benefit in taking measures that may be used to reduce fatigue in nurses, especially the fatigue related to work organization and social life.

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**Conflicts of Interest:** None declared.

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